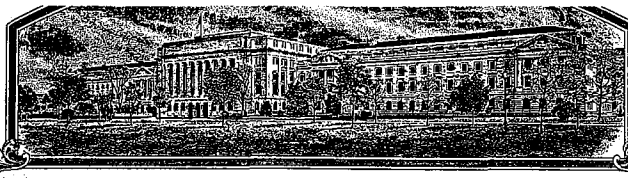


No.

200000125



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Holden's Foundation Seeds T. T. C.

Whereas, THERE HAS BEEN PRESENTED TO THE

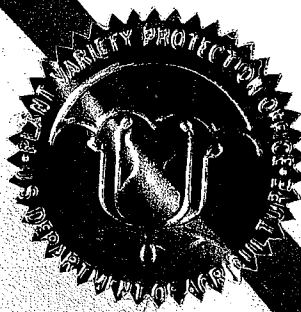
Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSE, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CORN, FIELD

'LH293'



In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this fifth day of February, in the year two thousand two.

Attest:

Paul M. Zahner

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Arthur C. Freeman

Secretary of Agriculture

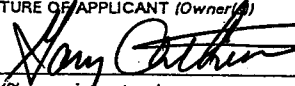
U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY DIVISION - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995:

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) (as it is to appear on the Certificate)		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER		3. VARIETY NAME	
HOLDEN'S FOUNDATION SEEDS L.L.C.		Ex4055		LH293	
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)		5. TELEPHONE (include area code)		FOR OFFICIAL USE ONLY	
503 S. MAPLEWOOD AVENUE PO BOX 839 WILLIAMSBURG, IA 52361		(319)668-1100		PVPO NUMBER 0000007	
		6. FAX (include area code)		DATE	
		(319)668-2453		1-7-00	
7. GENUS AND SPECIES NAME		8. FAMILY NAME (Botanical)		FILING AND EXAMINATION FEE:	
ZEA MAYS		GRAMINEAE		FEE \$ 2450	
9. CROP KIND NAME (Common name)				DATE 1-7-00	
CORN, FIELD				CERTIFICATION FEE:	
10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) (Common name).				FEE \$ 320.00	
LIMITED LIABILITY COMPANY				DATE 1/22/02	
11. IF INCORPORATED, GIVE STATE OF INCORPORATION		12. DATE OF INCORPORATION			
		DECEMBER 1, 1997			
13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS				14. TELEPHONE (include area code)	
MR. MARK ARMSTRONG HOLDEN'S FOUNDATION SEEDS L.L.C. 503 S. MAPLEWOOD AVENUE PO BOX 839 WILLIAMSBURG, IA 52361				(319)668-1100	
				15. FAX (include area code)	
				(319)668-2453	
16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)					
a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of the Variety d. <input checked="" type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input checked="" type="checkbox"/> Exhibit E. Statement of the Basis of the Applicant's Ownership f. <input checked="" type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in an approved public repository) g. <input checked="" type="checkbox"/> Filing and Examination Fee (\$2,450), made payable to "Treasurer of the United States" (Mail to PVPO)					
17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act)					
<input type="checkbox"/> YES (If "yes," answer items 18 and 19 below) <input checked="" type="checkbox"/> NO (If "no," go to item 20)					
18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?			19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED		
<input type="checkbox"/> YES <input type="checkbox"/> NO			<input type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED		
20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?					
<input type="checkbox"/> YES (If "yes," give names of countries and dates) <input checked="" type="checkbox"/> NO					
21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.					
The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.					
Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.					
SIGNATURE OF APPLICANT (Owner(s))			SIGNATURE OF APPLICANT (Owner(s))		
					
NAME (Please print or type)			NAME (Please print or type)		
GARY ARTHUR					
CAPACITY OR TITLE		DATE		CAPACITY OR TITLE	
PRESIDENT		1/3/00			

Origin and Breeding History of the Inbred

Exhibit A

LH293 was developed from the single cross of LH163 x LH181 by selfing and using the pedigree system of plant breeding. Yield, stalk quality, root quality, disease tolerance, late plant greenness, late plant intactness, ear retention, pollen shedding ability, silking ability and corn borer tolerance were the criteria used to determine the rows from which ears were selected during the development of LH293.

LH181, one of the progenitors of LH293, is a proprietary field corn inbred line of Holden's Foundation Seeds, LLC, of Williamsburg, Iowa. In 1991, Holden's Foundation Seeds, LLC, applied for plant variety protection of LH181. On October 31, 1991, LH181 was awarded certificate #9100068. LH181 was also issued utility patent #5,304,713 from the United States Patent Office on April 19, 1994. The other progenitor, LH163, is also a proprietary field corn inbred line of Holden's Foundation Seeds, LLC. In 1990, Holden's Foundation Seeds, LLC, applied for plant variety protection of LH163. On May 31, 1991, LH163 was awarded certificate #9000065. LH163 was also issued utility patent #5,285,001 from the United States Patent Office on February 8, 1994.

Enclosed is a copy of a letter from the USDA Seed Branch confirming that no other field corn inbreds have been named, 'LH293'.

On the following pages are a summary and description of the development of LH293. Also included are copies of pages from Holden's Foundation Seeds, Inc. nursery books. The rows associated with the development of LH293 have been highlighted.

LH293 has shown uniformity and stability for all traits described in Exhibit C. It has been self-pollinated and ear-rowed a sufficient number of generations, with careful attention to uniformity of plant type to ensure homozygosity and phenotypic stability. The line has been increased both by hand (Minnesota 1995 and 1996) and sibbed in isolated production fields (Hawaii 1999 and Iowa 1999) with continued observations for uniformity. Jon L. Geadelmann, PhD., the originating plant breeder, has observed LH293 all four generations it has been increased. The line is uniform, stable and no variant traits have been observed or are anticipated in LH293.

Origin and Breeding History of the Inbred
LH293=Ex4055=LH163 x LH181

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<u>Field/Row</u>	<u>Pedigree</u>	<u>Location</u>	<u>Year</u>
Schwarting	LH293	Iowa	1999
KA1A2	LH293	Hawaii	1999
461-470	Ex4055	Minnesota	1996
15478	LH163 x LH181 @7	Minnesota	1995
16371	LH163 x LH181 @6	Minnesota	1994
33889	LH163 x LH181 @5	Hawaii	1994
10795	LH163 x LH181 @4	Minnesota	1993
1893	LH163 x LH181 @3	Hawaii	1993
11227	LH163 x LH181 @2	Minnesota	1992
9774	LH163 x LH181 @1	Minnesota	1991
29373	LH163 x LH181	Hawaii	1991
40088	LH163	Iowa	1990
40085	LH181		

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Novelty Statement

Exhibit B

LH293 is most similar to LH181. However, the most distinguishing difference is plant height. LH293 is shorter in plant height than LH181. Enclosed is data collected at Williamsburg, Iowa, from two different planting dates in 1999, comparing the plant heights of LH293 and LH181 at 50 observations for each planting date. The data suggests a significant difference at the 1% probability level according to a paired T test in both comparisons. Means show that on average LH293 is shorter in plant height than LH181.

The silk color of both LH293 is light green, while the silk color of LH181 is pink. When using the Munsell Color Charts for Plant Tissues as a reference, the silk color of LH293 would be classified as 2.5GY 8/6 while the silk color of LH181 would be classified as 5RP 8/4.

LH293 appears to flower 2 days earlier than LH181.

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TWO SAMPLE TTEST LH293 PLANT HEIGHT VS LH181 PLANT HEIGHT **1999 IMHOFF**

Variety Name	Average	Standard Deviation	Sample Size	Analysis Type	Statistic	Probability Value
LH293	202	12.2	50	T-test	T=-11.67	0.0000
LH181	230	11.8	50		DF= 97	

Year of tests:	1999 Imhoff
Location of tests:	Williamsburg, Iowa

Mann-Whitney Confidence Interval and Test

LH293 N = 50 Median = 199.50
LH181 N = 50 Median = 231.50

Point estimate for ETA1-ETA2 is -29.00

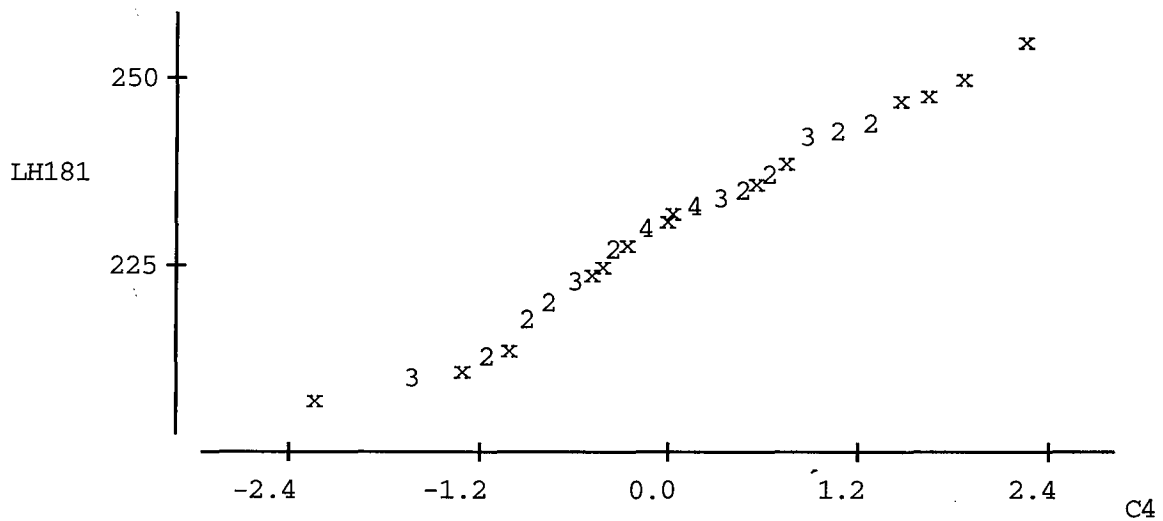
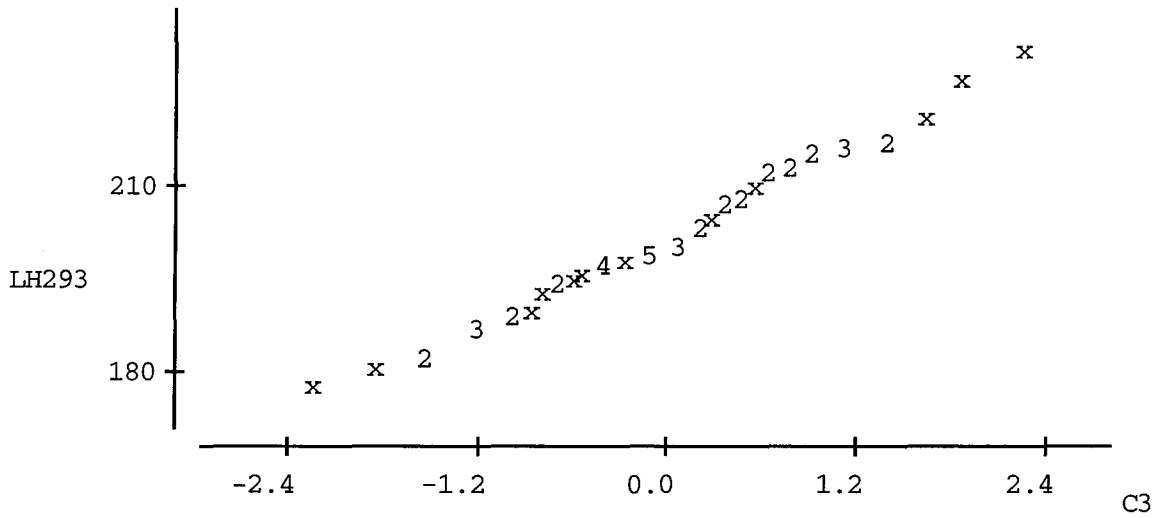
95.0 pct c.i. for ETA1-ETA2 is (-34.00,-23.00)

W = 1414.0

Test of ETA1 = ETA2 vs. ETA1 n.e. ETA2 is significant at 0.0000
The test is significant at 0.0000 (adjusted for ties)

5

TWO SAMPLE TTEST LH293 PLANT HEIGHT VS LH181 PLANT HEIGHT 1999 IMHOFF



200000125

**TWO SAMPLE TTEST LH293 PLANT HEIGHT VS LH181 PLANT HEIGHT
1999 E. FAIRGROUND**

Variety Name	Average	Standard Deviation	Sample Size	Analysis Type	Statistic	Probability Value
LH293	232.12	9.99	50	T-test	T=-8.05	0.0000
LH181	247.84	9.55	50		DF= 97	

Year of tests:	1999 E. Fairground
Location of tests:	Williamsburg, Iowa

Mann-Whitney Confidence Interval and Test

LH293 N = 50 Median = 234.50
LH181 N = 50 Median = 250.00

Point estimate for ETA1-ETA2 is -16.00

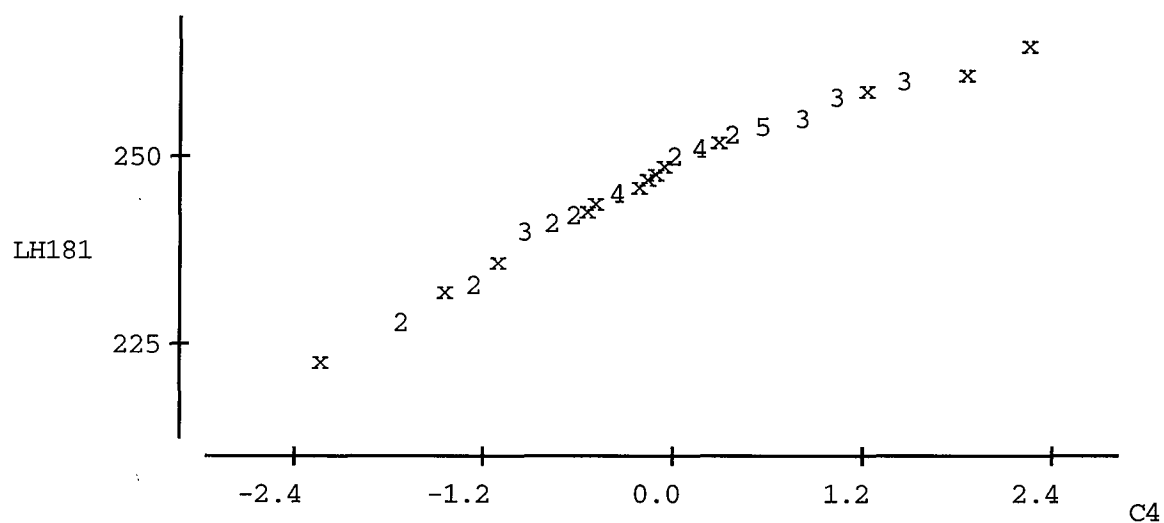
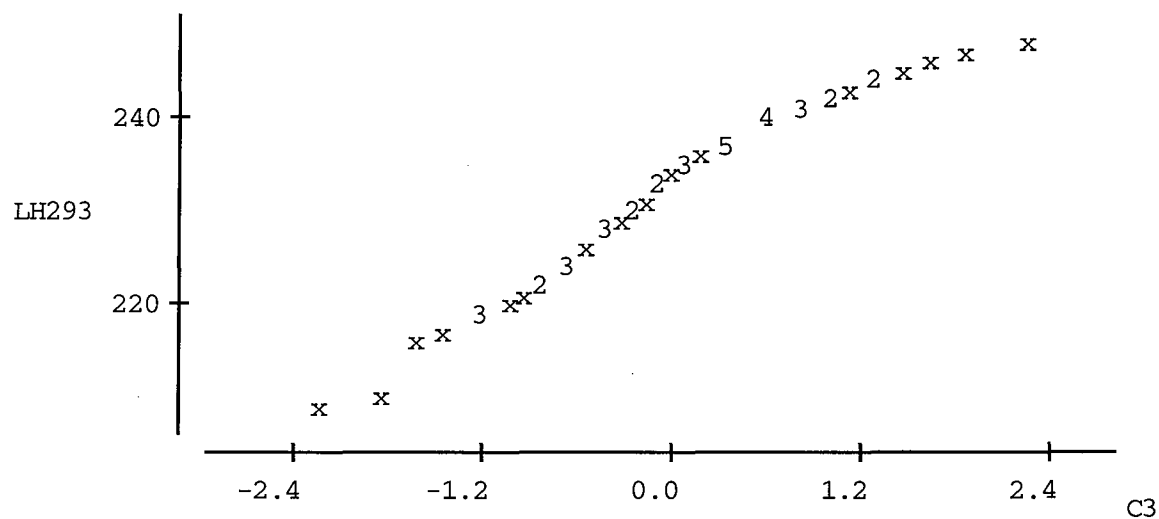
95.0 pct c.i. for ETA1-ETA2 is (-20.00,-12.00)
W = 1593.5

Test of ETA1 = ETA2 vs. ETA1 n.e. ETA2 is significant at 0.0000

The test is significant at 0.0000 (adjusted for ties)

TWO SAMPLE TTEST LH293 PLANT HEIGHT VS LH181 PLANT HEIGHT 1999 E. FAIRGROUND

200000125



United States Department of Agriculture, Agricultural Marketing Service
Science Division, Plant Variety Protection Office
National Agricultural Library Building, Room 500
Beltsville, MD 20705

OBJECTIVE DESCRIPTION OF VARIETY
CORN (Zea mays L.)

Name of Applicant(s) HOLDEN'S FOUNDATION SEEDS, L.L.C		Variety Seed Source IOWA 1998	Variety Name or Temporary Designation LH293																																										
Address (Street & No., or R.F.D. No., City, State, Zip Code and Country) 503 SOUTH MAPLEWOOD AVE WILLIAMSBURG, IA 52361		<div style="border: 1px solid black; padding: 2px;">FOR OFFICIAL USE</div> PVPO Number																																											
Place the appropriate number that describes the varietal characters typical of this inbred variety in the spaces below. Right justify whole numbers by adding leading zeroes if necessary. Completeness should be striven for to establish an adequate variety description. Traits designated by a '*' are considered necessary for an adequate variety description and must be completed.																																													
COLOR CHOICES (Use in conjunction with Munsell color code to describe all color choices; describe #25 and #26 in Comments section): <table style="width:100%; font-size: small;"> <tr> <td>01=Light Green</td> <td>06=Pale Yellow</td> <td>11=Pink</td> <td>16=Pale Purple</td> <td>21=Buff</td> </tr> <tr> <td>02=Medium Green</td> <td>07=Yellow</td> <td>12=Light Red</td> <td>17=Purple</td> <td>22=Tan</td> </tr> <tr> <td>03=Dark Green</td> <td>08=Yellow-Orange</td> <td>13=Cherry Red</td> <td>18=Colorless</td> <td>23=Brown</td> </tr> <tr> <td>04=Very Dark Green</td> <td>09=Salmon</td> <td>14=Red</td> <td>19=White</td> <td>24=Bronze</td> </tr> <tr> <td>05=Green-Yellow</td> <td>10=Pink-Orange</td> <td>15=Red & White</td> <td>20=White Capped</td> <td>25=Variegated (Describe)</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td>26=Other, (Describe)</td> </tr> </table>				01=Light Green	06=Pale Yellow	11=Pink	16=Pale Purple	21=Buff	02=Medium Green	07=Yellow	12=Light Red	17=Purple	22=Tan	03=Dark Green	08=Yellow-Orange	13=Cherry Red	18=Colorless	23=Brown	04=Very Dark Green	09=Salmon	14=Red	19=White	24=Bronze	05=Green-Yellow	10=Pink-Orange	15=Red & White	20=White Capped	25=Variegated (Describe)					26=Other, (Describe)												
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STANDARD INBRED CHOICES (Use the most similar (in background and maturity) of these to make comparisons based on grow-out trial data): <table style="width:100%; font-size: small;"> <tr> <td style="vertical-align: top;"> Yellow Dent Families: Family Members B14 CM105, A632, B64, B68 B37 B37, B76, H84 B73 N192, A679, B73, NC268 C103 Mo17, Va102, Va35, A682 Oh43 A619, MS71, H99, Va26 WF9 W64A, A554, A654, Pa91 </td> <td style="vertical-align: top;"> Yellow Dent (Unrelated): Co109, NO246, Oh7, T232 W117, W153R W182BN White Dent: CI66, H105, Ky228 </td> <td style="vertical-align: top;"> Sweet Corn: C13, Iowa5125, P39, 2132 Popcorn: SG1533, 4722, HP301, HP7211 Pipecorn: Mo15W, Mo16W, Mo24W </td> </tr> </table>				Yellow Dent Families: Family Members B14 CM105, A632, B64, B68 B37 B37, B76, H84 B73 N192, A679, B73, NC268 C103 Mo17, Va102, Va35, A682 Oh43 A619, MS71, H99, Va26 WF9 W64A, A554, A654, Pa91	Yellow Dent (Unrelated): Co109, NO246, Oh7, T232 W117, W153R W182BN White Dent: CI66, H105, Ky228	Sweet Corn: C13, Iowa5125, P39, 2132 Popcorn: SG1533, 4722, HP301, HP7211 Pipecorn: Mo15W, Mo16W, Mo24W																																							
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2. REGION WHERE DEVELOPED IN THE U.S.A.: * <u>2</u> 1=Northwest 2=Northcentral 3=Northeast 4=Southeast 5=Southcentral 6=Southwest 7=Other _____		Standard Seed Source <u>IOWA STATE UNIV.</u> <u>5</u>																																											
3. MATURITY (In Region Best Adaptability: show Heat Unit formula in "Comments" section): <table style="width:100%; font-size: small;"> <tr> <th style="text-align: left;">DAYS</th> <th style="text-align: left;">HEAT UNITS</th> <th></th> </tr> <tr> <td>* <u>70</u></td> <td><u>1399.0</u></td> <td>From emergence to 50% of plants in silk</td> </tr> <tr> <td>* <u>70</u></td> <td><u>1399.0</u></td> <td>From emergence to 50% of plants in pollen</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>From 10% to 90% pollen shed</td> </tr> <tr> <td>(*) _____</td> <td>_____</td> <td>From 50% silk to optimum edible quality</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>From 50% silk to harvest at 25% moisture</td> </tr> </table>		DAYS	HEAT UNITS		* <u>70</u>	<u>1399.0</u>	From emergence to 50% of plants in silk	* <u>70</u>	<u>1399.0</u>	From emergence to 50% of plants in pollen	_____	_____	From 10% to 90% pollen shed	(*) _____	_____	From 50% silk to optimum edible quality	_____	_____	From 50% silk to harvest at 25% moisture	<table style="width:100%; font-size: small;"> <tr> <th style="text-align: left;">DAYS</th> <th style="text-align: left;">HEAT UNITS</th> </tr> <tr> <td><u>76</u></td> <td><u>1567.5</u></td> </tr> <tr> <td><u>72</u></td> <td><u>1453.5</u></td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> </tr> </table>		DAYS	HEAT UNITS	<u>76</u>	<u>1567.5</u>	<u>72</u>	<u>1453.5</u>	_____	_____	_____	_____	_____	_____												
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* <u>81.8</u> cm Ear Height (to base of top ear node)	<u>9.66</u>	<u>50</u>																																											
<u>11.8</u> cm Length of Top Ear Internode	<u>1.67</u>	<u>50</u>																																											
<u>0.0</u> Average Number of Tillers	<u>0.0</u>	<u>50</u>																																											
* <u>1.8</u> Average Number of Ears per Stalk	<u>.51</u>	<u>50</u>																																											
<u>1</u> Anthocyanin of Brace Roots: 1=Absent 2=Faint 3=Moderate 4=Dark																																													
	Standard Deviation	Sample Size																																											
<u>208.7</u>	<u>7.73</u>	<u>50</u>																																											
<u>94.7</u>	<u>7.12</u>	<u>50</u>																																											
<u>11.3</u>	<u>.82</u>	<u>50</u>																																											
<u>0.0</u>	<u>0.0</u>	<u>50</u>																																											
<u>1.0</u>	<u>0.0</u>	<u>50</u>																																											
<u>1</u>																																													
Application Variety Data		Standard Inbred Data																																											

5. LEAF:	Standard Deviation	Sample Size	Standard Deviation	Sample Size
* <u>1 1.4</u> cm Width of Ear Node Leaf	<u>.84</u>	<u>50</u>	<u>9 5</u>	<u>.60</u>
* <u>7 4.7</u> cm Length of Ear Node Leaf	<u>5.27</u>	<u>50</u>	<u>7 0.1</u>	<u>1.92</u>
* <u>5</u> Number of leaves above top ear	<u>.59</u>	<u>50</u>	<u>5</u>	<u>.31</u>
<u>2 3</u> degrees Leaf Angle (measure from 2nd leaf above ear at anthesis to stalk above leaf)	<u>5.56</u>	<u>50</u>	<u>3 7</u>	<u>9.75</u>
* <u>0 2</u> Leaf Color (Munsell code <u>7.5GY 3/2</u>)			<u>0 2</u> (Munsell code <u>7.5GY 3/4</u>)	
<u>2</u> Leaf Sheath Pubescence (Rate on scale from 1=none to 9=like peach fuzz)			<u>2</u>	
<u>2</u> Marginal Waves (Rate on scale from 1=none to 9=many)			<u>4</u>	
<u>7</u> Longitudinal Creases (Rate on scale from 1=none to 9=many)			<u>3</u>	

6. TASSEL:	Standard Deviation	Sample Size	Standard Deviation	Sample Size
* <u>6</u> Number of Primary Lateral Branches	<u>1.69</u>	<u>50</u>	<u>7</u>	<u>1.39</u>
<u>1 0</u> Branch Angle from Central Spike	<u>4.52</u>	<u>50</u>	<u>4 4</u>	<u>10.20</u>
* <u>4 3.6</u> cm Tassel Length (from top leaf collar to tassel tip)	<u>4.23</u>	<u>50</u>	<u>4 4.7</u>	<u>2.96</u>
<u>6</u> Pollen Shed (Rate on scale from 0=male sterile to 9=heavy shed)			<u>7</u>	
<u>0 7</u> Anther Color (Munsell code <u>2.5GY 8/6</u>)			<u>0 7</u> (Munsell code <u>2.5GY 8/6</u>)	
<u>0 2</u> Glume Color (Munsell code <u>5GY 6/8</u>)			<u>0 2</u> (Munsell code <u>5GY 5/6</u>)	
<u>1</u> Bar Glumes (Glume Bands): 1=Absent 2=Present			<u>1</u>	

7a. EAR (Unhusked Data):

- * 0 1 Silk Color (3 days after emergence) (Munsell code 2.5GY 8/6)
- 0 1 Fresh Husk Color (25 days after 50% silking) (Munsell code 5GY 6/8)
- 2 1 Dry Husk Color (65 days after 50% Silking) (Munsell code 7.5YR 7/4)
- * 3 Position of Ear at Dry Husk Stage: 1=Upright 2=Horizontal 3=Pendent
- 5 Husk Tightness (Rate on scale from 1=very loose to 9=very tight)
- 2 Husk Extension (at harvest): 1=Short (ears exposed) 2=Medium (<8 cm)
3=Long (8-10 cm beyond ear tip) 4=Very Long (>10 cm)

26 *Olive Green*
0 9 (Munsell code 5Y 7/4)

0 1 (Munsell code 2.5GY 7/6)

2 1 (Munsell code 7.5YR 7/4)

1

5

2

7b. EAR (Husked Ear Data):

	Standard Deviation	Sample Size	Standard Deviation	Sample Size
* <u>1 5.9</u> cm Ear Length	<u>1.53</u>	<u>50</u>	<u>2 0.4</u>	<u>1.31</u>
* <u>3 8.1</u> mm Ear Diameter at mid-point	<u>1.80</u>	<u>50</u>	<u>3 8.5</u>	<u>1.70</u>
<u>8 1.4</u> gm Ear Weight	<u>16.33</u>	<u>50</u>	<u>1 1 8.0</u>	<u>16.58</u>
* <u>1 2</u> Number of Kernel Rows	<u>1.07</u>	<u>50</u>	<u>1 1</u>	<u>1.01</u>
<u>2</u> Kernel Rows: 1=Indistinct 2=Distinct			<u>2</u>	
<u>1</u> Row Alignment: 1=Straight 2=Slightly Curved 3=Spiral			<u>1</u>	
<u>1 7.6</u> cm Shank Length	<u>3.00</u>	<u>50</u>	<u>1 3.4</u>	<u>1.84</u>
<u>2</u> Ear Taper: 1=Slight 2=Average 3=Extreme			<u>2</u>	

8. KERNEL (Dried):

Standard Deviation

Sample Size

Standard Deviation Sample Size

1 0.0 mm Kernel Length.60501 1.3.60508.9 mm Kernel Width.60509.5.50505.2 mm Kernel Thickness.60505.0.40506 9.1 % Round Kernels (Shape Grade)4.88157 8.12.76151 Aleurone Color Pattern: 1=Homozygous 2=Segregating1(*) 1 9 Aleurone Color (Munsell code 2.5Y 8/2)1 9 (Munsell code 2.5Y 8/2)* 0 8 Hard Endosperm Color (Munsell code 2.5Y 8/10)0 8 (Munsell code 2.5Y 8/6)* 0 3 Endosperm Type: 1=Sweet (su1) 2=Extra Sweet (sh2) 3=Normal Starch
4=High Amylose Starch 5=Waxy Starch 6=High Protein 7=High Lysine
8=Super Sweet (se) 9=High Oil 10=Other0 32 8.7 gm Weight per 100 Kernels (unsized sample).27153 1.5.6115

9. COB:

Standard Deviation

Sample Size

Standard Deviation

Sample Size

* 2 9.5 mm Cob Diameter at mid-point2.10502 7.11.30501 1 Cob Color (Munsell code 10R 6/6)1 4 (Munsell code 10R 5/6)

10. DISEASE RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant):

leave blank if not tested; leave Race or Strain Options blank if polygenic):

A. Leaf Blights, Wilts, and Local Infection Diseases

— Anthracnose Leaf Blight (*Colletotrichum graminicola*)— Common Rust (*Puccinia sorghi*)— Common Smut (*Ustilago maydis*)5 Eyespot (*Kabatella zeae*)— Goss's Wilt (*Clavibacter michiganense* spp. *nebraskense*)— Gray Leaf Spot (*Cercospora zeae-maydis*)8 Helminthosporium Leaf Spot (*Bipolaris zeicola*) Race 33 Northern Leaf Blight (*Exserohilum turcicum*) Race 1— Southern Leaf Blight (*Bipolaris maydis*) Race —— Southern Rust (*Puccinia polysora*)— Stewart's Wilt (*Erwinia stewartii*)— Other (Specify) —8 Race 33 Race 1— Race —

B. Systemic Diseases

— Corn Lethal Necrosis (MCMV and MDMV)— Head Smut (*Sphacelotheca reiliana*)— Maize Chlorotic Dwarf Virus (MCDV)— Maize Chlorotic Mottle Virus (MCMV)— Maize Dwarf Mosaic Virus (MDMV) Strain —— Sorghum Downy Mildew of Corn (*Peronosclerospora sorghi*)— Other (Specify) —— Strain —

C. Stalk Rots

— Anthracnose Stalk Rot (*Colletotrichum graminicola*)— Diplodia Stalk Rot (*Stenocarpella maydis*)— Fusarium Stalk Rot (*Fusarium moniliforme*)— Gibberella Stalk Rot (*Gibberella zeae*)— Other (Specify) —

D. Ear and Kernel Rots

— Aspergillus Ear and Kernel Rot (*Aspergillus flavus*)— Diplodia Ear Rot (*Stenocarpella maydis*)— Fusarium Ear and Kernel Rot (*Fusarium moniliforme*)— Gibberella Ear Rot (*Gibberella zeae*)— Other (Specify) —

11. INSECT RESISTANCE (Rate from 1 (most susceptible) to 9 (most resistant); leave blank if not tested):

	Standard Deviation	Sample Size	Standard Deviation	Sample Size
— Banks Grass Mite (<i>Oligonychus pratensis</i>)				
— Corn Earworm (<i>Helicoverpa zea</i>)				
— Leaf-Feeding				
— Silk Feeding :				
— mg larval wt.				
— Ear Damage				
— Corn Leaf Aphid (<i>Rhopalosiphum maidis</i>)				
— Corn Sap Beetle (<i>Carpophilus dimidiatus</i>)				
— European Corn Borer (<i>Ostrinia nubilalis</i>)				
— 1st Generation (Typically Whorl Leaf Feeding)				
— 2nd Generation (Typically Leaf Sheath-Collar Feeding)				
— Stalk Tunneling :				
— cm tunneled/plant				
— Fall Armyworm (<i>Spodoptera frugiperda</i>)				
— Leaf-Feeding				
— Silk-Feeding :				
— mg larval wt.				
— Maize Weevil (<i>Sitophilus zeamaze</i>)				
— Northern Rootworm (<i>Diabrotica barberi</i>)				
— Southern Rootworm (<i>Diabrotica undecimpunctata</i>)				
— Southwestern Corn Borer (<i>Diatraea grandiosella</i>)				
— Leaf Feeding				
— Stalk Tunneling :				
— cm tunneled/plant				
— Two-spotted Spider Mite (<i>Tetranychus urticae</i>)				
— Western Rootworm (<i>Diabrotica virgifera virgifera</i>)				
— Other (Specify) _____				

12. AGRONOMIC TRAITS:

<u>7</u> Stay Green (at 65 days after anthesis) (Rate on a scale from 1=worst to 9=excellent.)	<u>7</u>
<u>0.0</u> % Dropped Ears (at 65 days after anthesis)	<u>0.0</u>
<u>0.0</u> % Pre-anthesis Brittle Snapping	<u>0.0</u>
<u>0.0</u> % Pre-anthesis Root Lodging	<u>0.0</u>
<u>0.0</u> % Post-anthesis Root Lodging (at 65 days after anthesis)	<u>0.0</u>
<u> </u> Kg/ha Yield of Inbred Per Se (at 12-13% grain moisture)	<u> </u>

13. MOLECULAR MARKERS: (0=data unavailable; 1=data available but not supplied; 2=data supplied)

0 Isozymes 0 RFLP's 0 RAPD's

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U.S. Department of Agriculture. 1936, 1937. Yearbook.

COMMENTS (eg. state how heat units were calculated, standard inbred seed source, and/or where data was collected. Continue in Exhibit D):

$$GDD = \frac{T_{max} + T_{min}}{2} - 50^{\circ}F$$

$$T_{max} < 86^{\circ}F$$

$$T_{min} \geq 50^{\circ}F$$

STANDARD SEED SOURCE: IOWA STATE UNIVERSITY

DATA COLLECTED @ WILLIAMSBURG, IA 1999

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Additional Description of the Inbred

Exhibit D

LH293 is a medium early season field corn inbred line that flowers 2 to 3 days earlier than LH172. It is a very good pollinator, but is not suitable as a seed parent in hybrid seed production.

LH293 contributes improved stalk and root strength along with better test weight to its resulting hybrids. LH293 hybrids are similar in maturity to LH168 hybrids. Hybrid performance has been best when crossed with early B73 type inbreds and with LH176.

Exhibit C: The main silk body of Mo17 is green, but as the silk hairs are exposed to sunlight they turn lighter and are more 'olive green' in color. Please change the verbal silk color of Mo17 from '9' (salmon) to '26' with the description being 'olive green'. On occasion, it is difficult for me to describe what I observe in the field and match it to a color chip in the book. I'm sometimes puzzled with what I observe and the resulting color match and this is one of those times.

After some thought and evaluation, I have concluded that the reason for the large standard deviations in my statistical analysis is poor experimental design. I neglected to take into account the effect the end plants in the row have in my analysis. One to sometimes four plants at the end of each row have a dramatic effect on the standard deviation of the individual plants being evaluated. My understanding of this effect on this statistical function and its contribution to variance components was poor. To correct this flaw in my analysis, I will not allow my technician to measure these end plants. I will also more closely monitor the growth and uniformity of the individual plants in the row being evaluated.

JMS 11/20/01

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

EXHIBIT E
STATEMENT OF THE BASIS OF OWNERSHIP

1. NAME OF APPLICANT(S) HOLDEN'S FOUNDATION SEEDS L.L.C.	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER Ex4055	3. VARIETY NAME LH293
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) 503 S. MAPLEWOOD AVENUE PO BOX 839 WILLIAMSBURG, IA 52361	5. TELEPHONE (include area code) (319)668-1100	6. FAX (include area code) (319)668-2453
7. PVPO NUMBER 2000000125 8. Does the applicant own all rights to the variety? Mark an "X" in appropriate block. If no, please explain. <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
9. Is the applicant (individual or company) a U.S. national or U.S. based company? If no, give name of country <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
10. Is the applicant the original owner? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO If no, please answer the following: a. If original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. national(s)? <input type="checkbox"/> YES <input type="checkbox"/> NO If no, give name of country _____ b. If original rights to variety were owned by a company, is the original owner(s) a U.S. based company? <input type="checkbox"/> YES <input type="checkbox"/> NO If no, give name of country _____		
11. Additional explanation on ownership (If needed, use reverse for extra space):		

PLEASE NOTE:

Plant variety protection can be afforded only to owners (not licensees) who meet one of the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definition.

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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